

Current research on the treatment of bromhidrosis

Zhuo Gong¹, Xian Zhao^{1,*}, Qingzhu Zhou¹

¹The First People's Hospital of Kunming, Kunming, Yunnan, 650000, China

*Corresponding author

Keywords: Bromhidrosis, surgery, treatment

Abstract: Although there have been high incidence of bromhidrosis, its pathogenesis is still not fully understood and there are no clear treatment guidelines. Many clinical treatments for bromhidrosis have been proposed, including topical medication, physiotherapy, injection therapy, and surgery. This article offers a summary and a review of the treatment of bromhidrosis and how effective each of them is.

Bromhidrosis is a hereditary disease which presents itself primarily during adolescence. Dealing with this disease during this stage can put a strain on sufferers' interpersonal relationships, increase their psychological stress, and frequently leave them feeling depressed. Even with these factors being considered, only a small percentage of bromhidrosis patients seek medical attention. Bromhidrosis, which is often accompanied by hyperhidrosis, is the result of microorganisms on the skin breaking down secretions from the apocrine glands. Treatment methods for bromhidrosis can be categorized as either non-surgical or surgical procedures.

1. Non-surgical treatment of bromhidrosis

1.1. Medication and topical products

This treatment method is simple, versatile, and inexpensive. It makes use of antibacterial and antiperspirants to inhibit secretions from the sweat glands, which can help to keep the skin dry and kills the bacteria responsible for the offending smell, thereby achieving therapeutic goals. Lam et al. ^[1] observed that applying fresh lemon slices directly to the armpits helped to reduce underarm odour. However, this might cause itching, irritation, and eczema at the application site. Another study revealed that patients with mild bromhidrosis benefited from using a newly-introduced physical and antimicrobial film that forms a positively charged barrier on the skin's surface and inhibits bacterial growth.

1.2. Physical therapy

1.2.1. Laser treatment

Laser treatment destroys the targeted hair follicles and sweat glands by transferring photothermal energy to subcutaneous tissue, thereby reducing the production of odour. This treatment method is highly efficient and minimally invasive. Peng Wang et al. ^[2] used a 1440nm Nd:YAG laser to treat

206 patients with varying degrees of bromhidrosis, noting a treatment efficiency rate of 89.81% and a complete satisfaction rate of 90.29% after a two-year follow-up. The particular laser they employed absorbed fat more readily and is specific to adipose tissue. While the apocrine glands are mainly concentrated in the fat layer, the fibre optic contact can cause coagulation of blood in small vessels with less damage and fewer postoperative adverse reactions. Fazel et al. ^[3] studied the effect of another laser (a 755nm alexandrite laser) on removing armpit hair in bromhidrosis patients, achieving an odour reduction rate of 63%. They concluded that this was the result of the laser altering the underarm microflora while removing hair, thus improving the scent of the secretions. The CO2 laser, 1064nm Nd: YAG laser, and 810nm semiconductor laser can also be used for the laser treatment of bromhidrosis.

1.2.2. Radiofrequency Microneedle Therapy

This is a new technique which uses insulated microneedles to penetrate the epidermis via radiofrequency technology. By aiming high-frequency currents to the dermis and subcutaneous layers of tissue without destroying the epidermis, the sweat glands are coagulated and killed off by the heat, thus treating the bromhidrosis. One study, which treated 102 bromhidrosis patients using gold radiofrequency microneedling, boasted cure rates of 97.14%, 93.55%, and 20% for mild, moderate, and severe patients respectively, along with an effective rate of 100% and no long-term adverse effects^[4]. Qingkun Zhong ^[5]et al. furthered this study by using negative pressure gold microneedle to treat 41 patients with bromhidrosis. After a 12-month follow-up, an effective rate of 90.24% and a patient satisfaction rate of 87.81% were shown. Thus, radiofrequency microneedling has proven to be an effective and less painful treatment method for bromhidrosis; however, adverse reactions such as burns and upper limb numbness might still occur.

1.2.3. Microwave and Ultrasound therapy

This treatment method attacks sweat glands by causing local thermal damage while also stimulating tissue repair. Common adverse reactions included localised redness as well as pain and numbness in the axillary skin. Microwave treatment has also been shown to lead to temporary median and ulnar neuropathy. Side effects of ultrasound treatment method were temporary axillary tenderness, redness, swelling, numbness, and bruising.

1.3. Injection treatment

1.3.1. Botulinum toxin treatment

This treatment method blocks the innervation of acetylcholinergic nerve fibres, which then reduces the secretion of the sweat glands. The most common type of botulinum toxin is type A, but there are reports of type B also being effective for the treatment of bromhidrosis. The retention time of the first botulinum toxin injection was 4 to 6 months. However, after multiple injections, retention could last up to 8.5 months without any long-term adverse effects. Yet another study, which compared botulinum toxin types A and B, showed that botulinum toxin type B was more effective in treating bromhidrosis. Even still, botulinum toxin type B is not yet approved for clinical treatment in China. The advantages of this treatment method are that it has a short recovery period, is less invasive, and has a higher efficiency rate, making it one of the most commonly used methods for treating bromhidrosis.

1.3.2. Anhydrous alcohol

Subcutaneous injections of anhydrous ethanol into the bilateral axillae dehydrate and denature the proteins, thus destroying the apocrine glands. This treatment method does not result in any permanent side effects, just temporary local skin necrosis^[6]. But this procedure is rarely used in clinical practice.

2. Surgical treatment of bromhidrosis

2.1. Small incision axillary sweat gland excision

This is a common surgical procedure that is performed by making one or two 2 cm incisions along the axillary line, separating well below the incision to reach the superficial fat layer, and then flipping the flap to remove the sweat gland tissue. Van T. N. et al.^[7] followed up on 31 patients for 6 months. His findings showed that 56 of 62 axillae were essentially cured, with necrosis of the skin occurring in 2 axillae and hematoma occurring in 3 axillae, and there were no serious post-op complications noted.

2.2. Axillary subcutaneous sweat gland curettage

In this procedure, an incision of no more than 1 cm is made in the central axilla, with the skin then being separated from the subcutaneous tissue. The subcutaneous tissue and sweat glands are then removed via curettage. A study by Huang Jian et al.^[8] featuring 148 patients with a total of 296 axillae, 287 axillae were cured, only 3 axillae developed skin necrosis, and only 1 axilla developed a subcutaneous hematoma.

2.3. Aspiration with negative pressure in axillary subcutaneous sweat gland

This procedure uses negative pressure to repeatedly suck and scrape the subcutaneous tissue with a liposuction needle to damage the sweat glands after using tumescent anesthesia in the armpit area. A study conducted by Hu X. et al^[9] reported a positive outcome rate of 94.9% and a patient satisfaction rate of 93.7% among 79 patients after a 12–24 months follow-up. There were a few notable complications, including 3 cases of subcutaneous hematoma and 4 cases of localised skin necrosis. Another study reported an overall efficiency of 97.22% in 56 patients, and this study group too did not experience any serious complications^[10].

2.4. Fusiform full-thickness resection

At one point, this was a commonly used procedure. However, it is now no longer utilized. With this procedure, the skin, subcutaneous tissue, sweat glands, and fatty tissue within the axillary hair area are all removed using a fusiform incision. Two sides of the incision edge are free under the skin and then directly kept together by sutures. Although this seems to be a simple procedure, the incision that is made is prone to fracture and scar hypertrophy. In severe cases, cicatricial contracture can limit upper arm function. Over time, the shape of the incision was altered to that of an "S" or "Z", which helped reduce the tension of the incision and prevent scar hypertrophy.

2.5. Thoracic sympathetic nerve dissection

This procedure is commonly used to treat axillary hyperhidrosis by thoracoscopically disconnecting the T2–T4 sympathetic nerve chain that innervates the axillary and palmar sweat

glands. Although the dissection of the thoracic sympathetic nerve did improve bromhidrosis, the odour was not improved as much. Because of this, this procedure is rarely used in clinical practice.

3. Combination therapy

The demand for minimally invasive treatment of bromhidrosis has increased. Patients are now seeking to assure efficacy of treatment while simultaneously decreasing the recovery period and leaving behind no visible scarring. In order to achieve these desired results, combination therapy has become more widely utilized. For example, combining small incision trimming with curettage, negative pressure aspiration with curettage, botulinum toxin type A and small incision trimming, and CO2 laser with botulinum toxin type A have all achieved satisfactory results, including higher cure/patient satisfaction rates along with decreased postop complications^[11].

4. Summary

The key to the effective treatment of bromhidrosis is the removal of the apocrine glands. The most complete treatment to date is achieved through surgery; however, this option comes with various complications. Conversely, although non-surgical treatment is less invasive and allows a faster recovery, it is less effective than surgical treatment with a higher recurrence rate. In the end, each treatment method has their own advantages and disadvantages; neither one on its own can completely address the problems caused by bromhidrosis. For patients with mild to moderate symptoms, non-surgical treatment options are recommended. However, for patients with more severe conditions, surgery is likely the best option. Either way, the final treatment plan should comply with the patient's wishes and take into account each individual's situation. As research into the treatment of this disease continues, we hope to develop a treatment that achieves the most ideal patient outcome in terms of efficiency, minimal invasion, quick recovery speed, and lack of adverse reactions.

References

- [1] Lam Hoai XL, Kabagabo C, Simonart T. Treatment of axillary bromhidrosis with lemon applications. *Dermatol Ther.* 2020 Aug 5: e14133.
- [2] Peng Wang, Dong Luo, Caixia An, Yannan Zhao, Xiaojing Kang. Efficacy of Nd: YAG lasertreatment for bromhidrosis in 206 cases [J]. *Chinese aesthetic medicine*, 2019, 28(3):66-69.
- [3] Fazel Z, Majidpour A, Behrangi E, et al. Using the Hair Removal Laser in the Axillary Region and its Effect on Normal Microbial Flora. *Lasers Med Sci.* 2020 Summer; 11(3):255-261.
- [4] Pengfeng Zha, Yuling Wang, Fang Zheng, Lei Guo, Yamei Li, Zhan Taiguo. Clinical effects of gold microneedle radiofrequency in the treatment of bromhidrosis [J]. *Chinese Journal of Aesthetic Plastic Surgery*, 2019, 30(9): 552-553, 565.
- [5] Qingkun Zhong, Meng Na, Xinyan Ge, Lihui Li, Jie Song, Qingmei Zi. Efficacy of negative pressure gold microneedle radiofrequency in the treatment of bromhidrosis [J]. *Dermatology and Venereology*, 2022, 44(5):415-417.
- [6] Asilian A, Shahbazi M, Abtahi-Naeini B, et al. Percutaneous ethanol injection as a promising and minimally invasive treatment for axillary osmidrosis: Double-blinded randomized controlled trial. *Indian J Dermatol Venereol Leprol* 2018; 84: 157-162.
- [7] Van TN, Manh TN, Minh PPT, et al. The Effectiveness of Local Surgical Technique in Treatment of Axillary Bromhidrosis. *Open Access Maced J Med Sci.* 2019; 7(2):187-191.
- [8] Jian Huang, Liyun Xie, Chang Fan, Guangzhi Yan. Clinical application of minimally invasive small incision curettage near the anterior and posterior axillary lines for the cure of axillary bromhidrosis [J]. *Chinese Journal of Aesthetic Plastic Surgery*, 2021, 32(9):571-573.
- [9] Hu X, Chen B, Yang D. Liposuction-assisted circumferential trimming in treatment of axillary osmidrosis (AO). *J Dermatolog Treat.* 2018 Nov; 29(7):709-714.
- [10] Lin Xifeng, Lu Yipu, Wang Tao. Efficacy of minimally invasive keyhole negative pressure aspiration for bromhidrosis and analysis of factors influencing postoperative complications [J]. *Journal of Tissue Engineering and*

Reconstructive Surgery, 2021, 17(4):335-338.

[11] Li CY, Wang XF, Zhou HY, et al. Refined tumescent liposuction-curettage with pruning in small incisions for treatment of axillary bromhidrosis. *Dermatol Ther*. 2021 Jan; 34(1): e14690.